(12) UK Patent Application (19) GB (11) 2 317 505 (13) A

(43) Date of A Publication 25.03.1998

(21) Application No 9625669.8

(22) Date of Filing 10.12.1996

(30) Priority Data
(31) 96041252 (32) 20.09.1996 (33) KR

(71) Applicant(s)
KAMCO (Korea Automotive Motor Corporation)

(Incorporated in the Republic of Korea)

232 Kumho-Ri, Buyong-Myun, Cheongwon-Gun, Choongchungbuk-Do, Republic of Korea

(72) Inventor(s)
Jang Hwan Hwang

(74) Agent and/or Address for Service
W H Beck, Greener & Co
7 Stone Buildings, Lincoln's Inn, LONDON, WC2A 3SZ, United Kingdom

(51) INT CL[6]
H02K 5/167 5/00 5/14 // H01R 39/38

(52) UK CL (Edition P)
H2A AKA1B AKJ2 AKL2 AK108 AK121 AK213R AK214R AK217S AK405 AK501 AK502 AK508 AK518

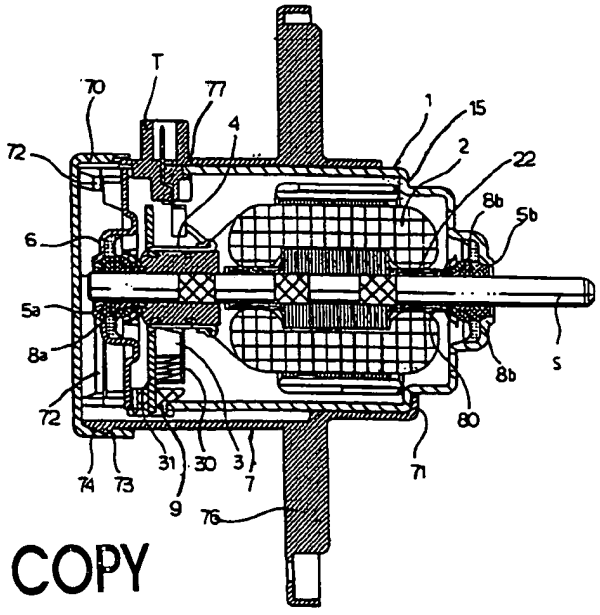
(56) Documents Cited
GB 2003673 A GB 1308405 A GB 0998756 A
EP 0088946 A2 US 4533260 A

(58) Field of Search
UK CL (Edition O) H2A AKH2 AKH2A AKH2B AKJ1 AKJ2
INT CL[6] F16F 15/10, H02K 5/167 5/173 5/24 7/08 15/16
ONLINE:WPI,CLAIMS

(54) Vibration damping/endplay adjustment/mounting in an electric motor

(57) A motor, for example, for a vehicle, has a pair of friction washers (8a, 8b) inserted onto its armature shaft (S) for reducing the vibration of sintered bearings (5a, 5b) supporting the armature shaft and preventing oil from being sprayed. Each friction washer (8a) has a circular dishshaped extension surrounding a respective bearing, and protrusions (80) received in grooves associated with the shaft (S) or with a commutator (4) carried thereby. The use of such friction washers reduces the number of parts in the motor and prevents slippage whereby the thrust gap is maintained. A brush holder stay (31), to which a brush holder (30) is fixed, is fixed to the motor housing (1) by way of a rubber damper (9). This reduces the resonance of the brush holder and prevents chattering noise (brush noise) being transferred to the housing. A mounting bracket is disclosed.

FIG 2



GB 2 317 505 A

FIG 1

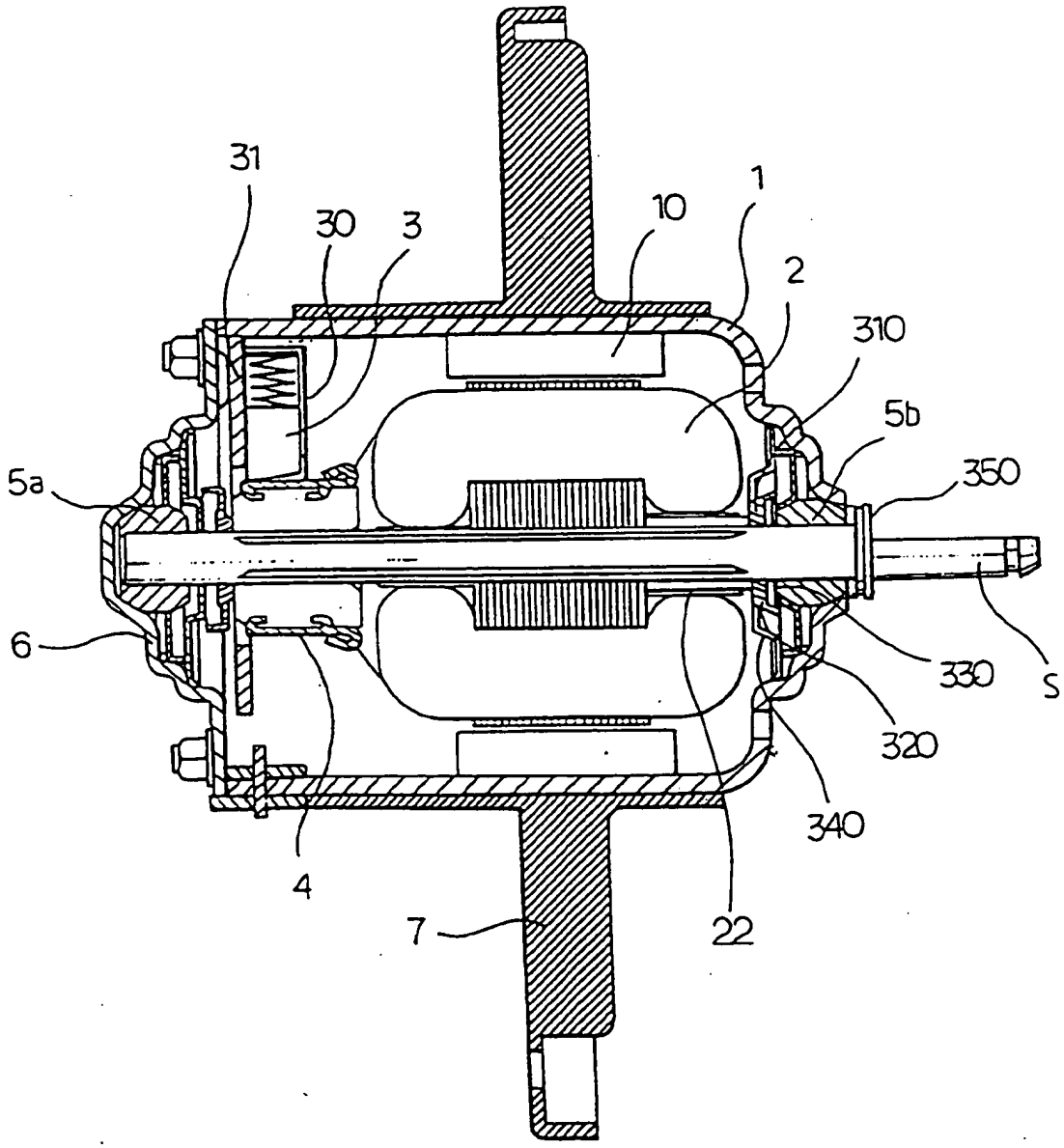


FIG 2

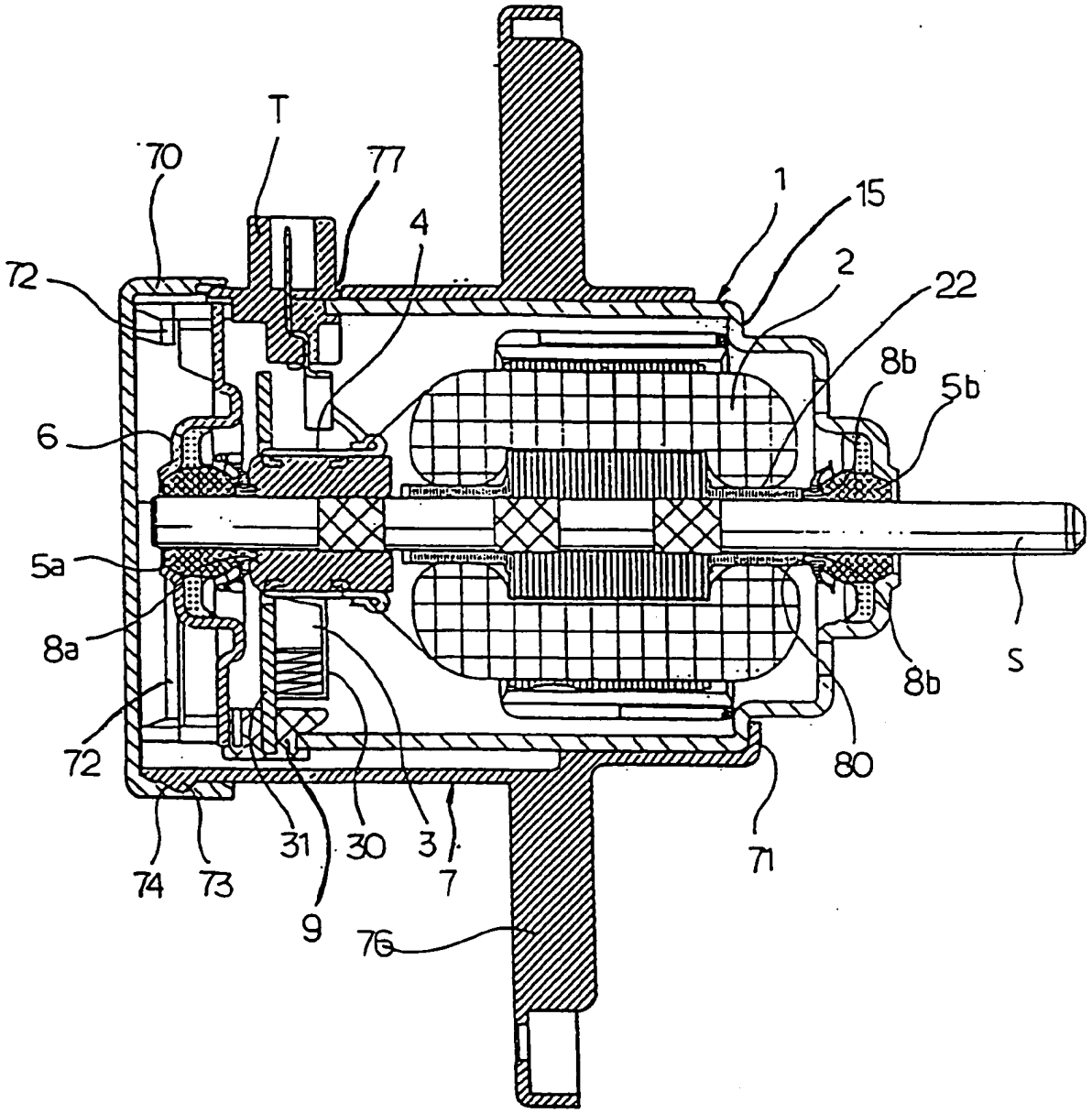
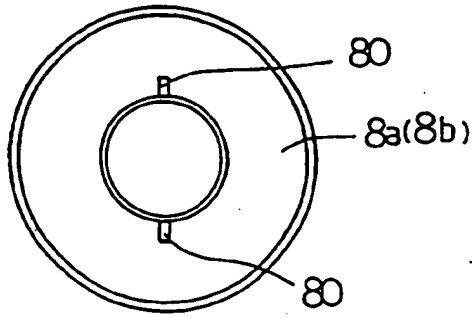


FIG 3

(A)



(B)

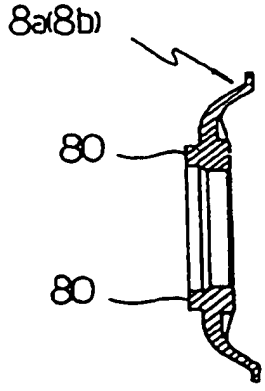
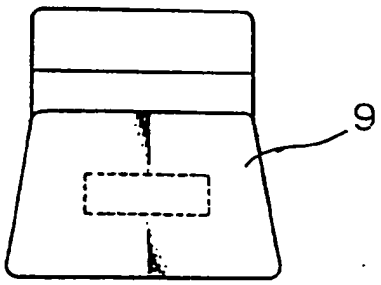


FIG 4

(A)



(B)

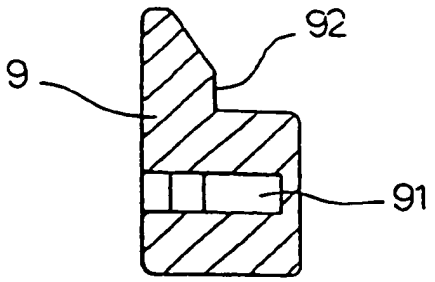
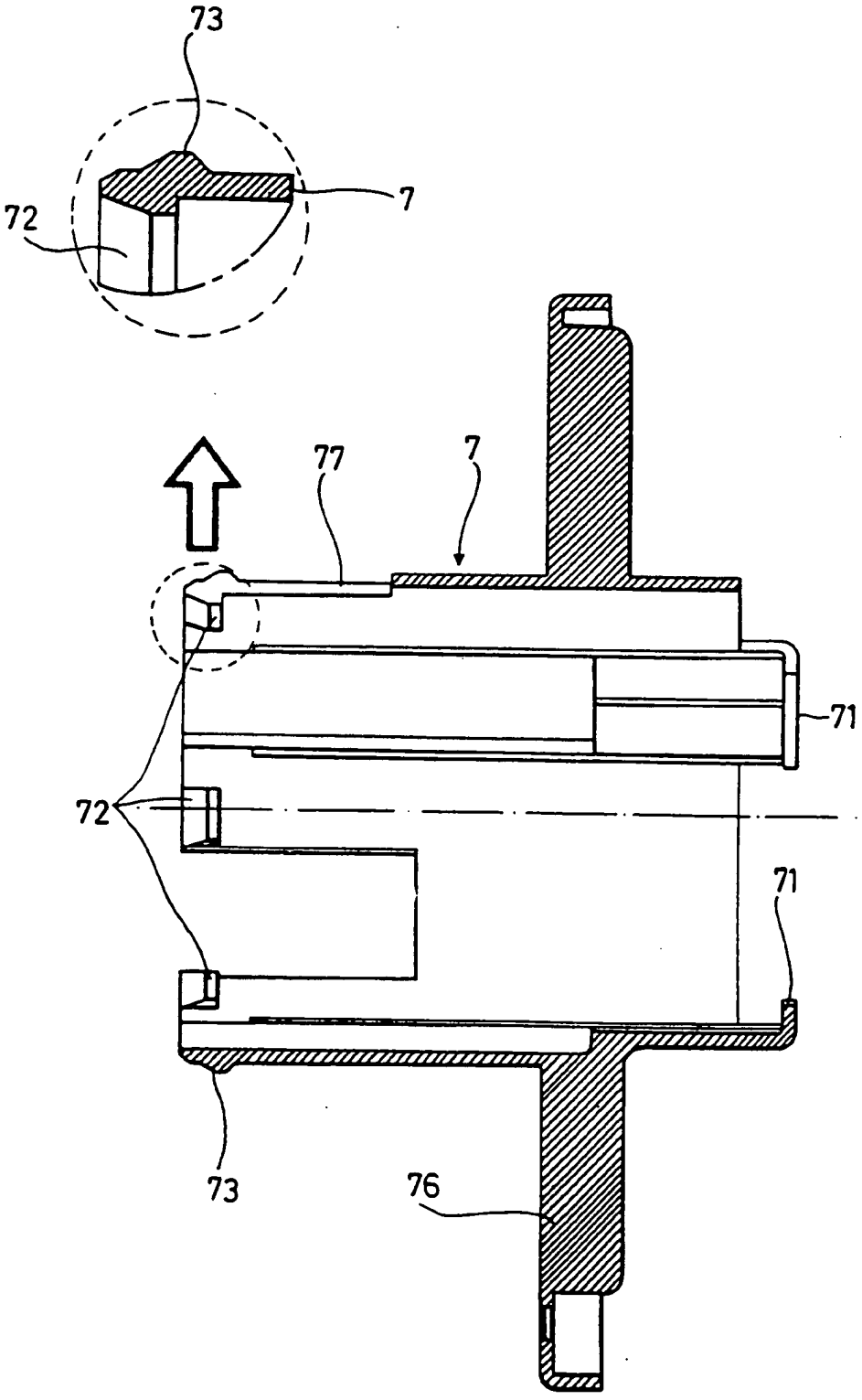


FIG 5



IMPROVEMENTS IN OR RELATING TO MOTORS

The present invention relates to a motor, for example, for a vehicle.

In known motors, a thrust gap adjusting procedure has to be undertaken after the armature is assembled in the housing. If the thrust gap is inaccurate, a plurality of gap adjusting washers may be inserted or removed.

The degree of adjustment available from washers is limited to the thickness of an individual washer, and noise may occur because of the presence of the washers.

It is also known to engage a brush holder stay, for supporting the brush holder, with an end shield of the armature shaft. This may cause a chattering noise to be transferred to the housing.

It is an object of the present invention to provide an improved motor.

According to a first aspect of the present invention there is provided a motor having an armature fixed to a housing in which a permanent magnet is received, and a brush contacting a commutator of an armature shaft, the motor further comprising a number of friction washers carried on the armature shaft for reducing the vibration of bearings supporting the armature shaft.

An embodiment of a motor of the invention is capable of reducing the number of parts and of maintaining a thrust gap by preventing a slippage.

In an embodiment of the invention one side of the or each friction washer has a circular dishshaped extension surrounding a respective bearing of the armature shaft, the other side of the or each friction washer has protrusions insertable into the armature or into a commutator.

Preferably, the motor further comprises a brush holder engaged with a brush holder stay, and a damper assembled to said brush holder stay by

means of which the brush holder is coupled to the housing.

An embodiment of the a motor of the invention is capable of preventing a chattering noise (a brush noise) by reducing the resonance of the brush holder and its support by the use of said damper.

In an embodiment, one side of the friction washer contacts a sintered bearing, and the friction washer is fixed to an insulating disc.

In an embodiment, a flange is provided to fix both upper and lower portions of a housing without a screw engaging process.

Embodiments of the present invention will hereinafter be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic cross-sectional view illustrating a substantially conventional vehicle motor;

Figure 2 is a schematic cross-sectional view illustrating a motor for a vehicle of the present invention;

Figure 3A is a front view illustrating a friction washer of a vehicle motor of the present invention;

Figure 3B is a side view illustrating a friction washer of a vehicle motor of the present invention;

Figures 4A and 4B are views illustrating a rubber damper fixed to a brush holder stay in a motor of the present invention; and

Figure 5 is a cross-sectional view of a supporting flange for the motor.

Figure 1 is a schematic cross-section view illustrating a substantially conventional vehicle motor. A housing 1 in which a permanent magnet 10 is arranged includes an armature 2. The armature 2 is supported by a sintered bearing unit 5 having sintered bearings 5a and 5b and serves to generate a current in cooperation with a commutator 4 drivingly connected with a shaft S and a brush 3.

The shaft S includes a stopper 310, which is preferably made of a nylon or the like, a rubber washer 320, a slip washer 330, and a holder plate 340 disposed for supporting the sintered bearing unit 5, so that it is possible

to absorb a predetermined impact or vibration and prevent an oil from being sprayed.

However, the above-described substantially conventional vehicle motor has the following disadvantages.

Since the thrust gap adjusting operation of the motor is performed after the armature 2 and an end shield 6 are assembled to the housing 1, when the thrust gap is inaccurate, a plurality of gap adjusting washers 350 have to be additionally inserted or removed. Therefore, a number of additional washer assembling processes are disadvantageously required, thus increasing the number of the motor fabrication processes.

In addition, since the thrust gap adjusting operation of the motor is performed by using a plurality of additionally provided gap adjusting washers 350, it is impossible to obtain a desired thrust gap. Moreover, noise may occur due to such washers in the system.

Furthermore, since the brush holder stay 31 disposed for fixing the brush holder 30 is integrally engaged with the end shield 6 through a cocking process, a chattering noise which occurs during the operation of the motor may be transferred to the housing 1 and the end shield 6.

In addition, since the stopper 310, the rubber washer 320, the slip washer 330 and the damper are disposed in the friction portion between the shaft S and the sintered bearing unit 5, the number of the parts is many, and the construction of the system becomes complicated. Therefore, an automated system for fabricating the motor is impossible.

In addition, since the stopper 310 assembled to the shaft S may not be rotated together with the shaft S due to the slippage therebetween, a friction may occur therebetween, so that the thrust gap is increased due to such friction, and thus a noise may occur in the system during the operation of the motor.

Furthermore, since one surface of the brush holder 30 to which the

brush 3 is fixed is open, it is impossible to maintain a desired size after the brush holder 30 is assembled to the brush holder stay 31. In addition, since the gap between the brush 3 and the brush holder 30 can not be constantly maintained, a chattering noise (a brush noise) may occur.

In addition, since a flange 7 is inserted onto the outer circumferential surface of the housing 1 and supports an end cover, a plurality of bolts are additionally used in order for the flange not to be separated from the motor.

In addition, since end portion of the housing 1 scratches an inner surface of the flange 7 when assembling the flange 7, a chip may be formed and introduced into the interior of the motor.

Figure 2 is a schematic cross-sectional view illustrating a motor for a vehicle of the present invention.

As shown in Figure 2, a housing 1 in which a permanent magnet 10 is arranged includes an armature 2. A brush 3 is drivingly connected with a commutator 4 of an armature shaft S. A pair of friction washers 8a and 8b are inserted onto the armature shaft S. The friction washers 8a and 8b are directed to effectively absorbing a vibration due to sintered bearings 5a and 5b disposed for supporting the armature shaft S. The friction washers 8a and 8b are preferably made of a rubber or of a plastics material.

Figure 3A is a front view illustrating a friction washer of a motor, and Figure 3B is a side view illustrating a friction washer of a motor of the present invention. The friction washers 8a and 8b have a dish edge shaped portion or a circular extended edge portion for preventing an oil from being sprayed to the sintered bearings 5a and 5b. Thus, the dish edge shaped portions or the circular extended edge portions of the friction washers 8a and 8b serve the same function as the holder plate of the conventional motor. A pair of protrusions 80 are formed opposite each circular extended edge portion, respectively, in order for the protrusions 80 to be inserted into an insulating disc 22 so that the armature shaft S and the friction washers 8a and 8b are rotated together. The insulating disc 22 is made of a resin and is inserted into the armature 2 and assembled to the commutator 4.

Therefore, since the friction washers 8a and 8b are fixed to the insulating disc 22, even though the armature shaft S is rotated, both surfaces of each of the friction washers 8a and 8b do not contact with other elements. Namely, only one surface positioned at the sintered bearings 5a and 5b contacts with other elements, so that it is possible to reduce friction due to the slippage.

In a motor of the invention, the rubber washers and the holder plate are unnecessary for preventing a spray of oil, thus reducing the cost of fabricating the motor and simplifying the fabrication process.

In addition, in the present invention, the thrust gap is adjusted by the friction washers 8a and 8b inserted onto the armature shaft S.

The adjustment of the thrust gap is performed as follows. An armature assembly, including the brush 3 and the commutator 4 which are inserted onto the armature shaft S is assembled in the housing 1 in which the permanent magnet 10 is arranged. Thereafter, the armature assembly is inwardly pushed until one surface of each of the friction washers 8a and 8b comes into contact with the sintered bearings 5a and 5b, respectively, disposed in the housing 1 and the end shield 6.

When the friction washers 8a and 8b contact with the sintered bearings 5a and 5b, and are not inwardly pushed any more, the armature assembly slightly pulls in the reverse direction of the assembly.

The sintered bearings 5a and 5b are spatially separated from each other. At this time, the distance therebetween is measured. When a desired thrust gap is obtained therebetween, the housing 1 and the end shield 6 is cocked in order for the end shield 6 not to move.

Namely, the present invention is directed to more simply adjusting the thrust gap by performing the thrust gap adjusting operation when assembling the motor without inserting the gap adjusting washers compared to the conventional art, whereby it is possible to more easily adjust the thrust gap between the friction washers 8a and 8b and the sintered bearings 5a and 5b.

In addition, it is possible to reduce the motor fabrication cost and to remove the washer noise by removing the thrust gap adjusting washers.

Moreover, it is possible to fabricate a more accurate motor, and the brush holder 30 is made in a box type so as to reduce the chattering noise.

The brush holder stay 31 to which the brush holder 30 is fixed and the end shield 6 are separated from each other, and the brush holder stay 31 is supported by the rubber damper 9 and is assembled to the housing 1, for thus preventing the chattering noise (a brush noise) from being transferred to the housing 1.

As shown in Figure 4, since the rubber damper 9 includes an assembly portion 91 for fixing the brush holder stay 31 and a fixing portion 92 partially contacting with the inner surface of the housing 1, the brush holder stay 31 can be arranged in the housing 1 in a floating type.

As described above, in the motor for a vehicle according to the present invention, the brush holder stay 31 is not directly fixed to the housing 1. Namely, the brush holder stay 31 is assembled to the housing in a state that the brush holder stay 31 is supported by the rubber damper 9, so that the rubber damper 9 blocks the chattering noise which occurs during the operation of the motor from being transferred to the brush holder stay 31, for thus preventing the noise from being transferred to the housing 1 and the end shield 6.

As shown in Figures 2 and 5, fixing portions 71 and 72 are formed in the flange 7 for fixing both ends of the housing 1 for example, for fixing the motor to a vehicle. The flange 7 is inserted in the direction that the fan (not shown) is assembled, so that the flange 7 is assembled to the housing 1.

The fixing portions 71 and 72 include an inwardly bent portion and protrusion 73 which are extended from both ends of the hollow flange 7. The flange 7 also comprises an engaging portion 76 for fixing to a vehicle body and formed in the outer surface thereof, and a terminal extension portion 77 through which the protrusion 73 and a terminal T are extended, so that the

recessed portion 74 of the flange cover 70 formed for covering the end shield 6 is engaged to the protrusion 73.

A groove 74 mating with the protrusion 73 is formed in the flange cover 70 disposed for surrounding the end shield 6 assembled to the housing 1. The flange cover 70 is detachably attached to the flange 7.

The flange 7 assembled to the housing of the motor is supported by a recess 10 of the housing 1 having a predetermined height with respect to the fixing portion 71, and the fixing portion 72 is supported by an end portion of the housing to which the end shield 6 is assembled in order for the flange to support both ends of the motor, whereby the flange can not be easily released from the motor.

In the invention, the process for additionally engaging a screw for preventing an escape of the flange from the motor is removed. In addition, it is possible to prevent the housing from scratching the inner surface of the flange by inserting the flange in the direction that the fan of the motor is assembled.

As described above, a motor for a vehicle of the present invention is basically directed to simplifying the structure of the motor, improving the workability and productivity of the motor, and significantly reducing the number of parts of the motor, and the motor fabrication cost.

In addition, it is possible to obtain a constant and accurate thrust gap by inserting a friction washer for preventing a spraying of oil with respect to the friction portion of the shaft and allowing only the sintered bearing portion to have a friction surface during the operation of the motor, for thus achieving a desired resonant effect of the support portion and preventing the chattering noise from being transferred to the supporting portion.

Moreover, it is possible to reduce the number of processes by assembling the motor and adjusting the thrust gap at the same time.

It will be appreciated that various modifications, additions and

substitutions may be made to the embodiments described and illustrated without departing from the scope of the invention as defined in the accompanying claims.

CLAIMS

1. A motor having an armature fixed to a housing in which a permanent magnet is received, and a brush contacting a commutator of an armature shaft, the motor further comprising a number of friction washers carried on the armature shaft for reducing the vibration of bearings supporting the armature shaft.

2. A motor as claimed in Claim 1, wherein one side of the or each friction washer has a circular dishshaped extension surrounding a respective bearing of the armature shaft, and the other side of the or each friction washer has protrusions insertable into the armature or into a commutator.

3. A motor as claimed in Claim 2, wherein said friction washers are directed to adjusting a thrust gap and maintaining a predetermined distance of the thrust gap.

4. A motor as claimed in Claim 3, wherein said thrust gap is adjusted by assembling an armature assembly, in which a brush and the commutator are assembled to one end of the shaft, to an inner side of the motor housing, and pushing the friction washer until one surface thereof comes into contact with sintered bearings arranged in the housing and the end shield, and when the friction washers abut with the sintered bearings and do not move any more, by pulling the armature assembly in the reverse direction of the assembly, to obtain a predetermined thrust gap, whereby an end shield is cocked with respect to the housing.

5. A motor as claimed in any preceding claim, further comprising a brush holder engaged with a brush holder stay, and a damper assembled to said brush holder stay by means of which the brush holder is coupled to the housing.

6. A motor as claimed in any preceding claim, further comprising fixing portions fixed to the housing and a protrusion which are formed in a flange assembled to the housing for fixing the motor, and a groove mating with the protrusion and formed in a flange cover, whereby the flange cover is

detachably attached to the flange.

7. A motor substantially as hereinbefore described with reference to the accompanying drawings.

The Patent Office

Application No:	GB 9625669.8	**Examiner:**	John Cockitt
Claims searched:	1-6	**Date of search:**	27 February 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H2A [AKJ2, AKJ1, AKH2, AKH2A, AKH2B]

Int Cl (Ed.6): H02K [07/08, 05/24, 15/16, 05/167, 05/173]; F16F [15/10]

Other: ONLINE; WPI, CLAIMS

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2003673A	SODECO - see fig 3	1 at least
X	GB1308405A	SIEMENS - see washers 11,12	1 at least
X	GB0998756A	ZINSSER - see whole document	1 at least
X	EP0088946A2	SIEMENS - see sleeve 6	1 at least
X	US4533260A	VALEO - see washer assemblies	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.